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ARCHEOLOGICAL SURVEY ALONG SALS CREEK DITCH

by

Michael Sierzchula
Donna Shepard
and Robert H. Lafferty III



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MID-CONTINENTAL RESEARCH ASSOCIATES

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ABSTRACT

Mid-Continental Research Associates, Inc., conducted an archeological survey along both sides of a 1 mile long section of Sals Creek Ditch for the Memphis District, U. S. Army Corps of Engineers. The survey, conducted in October 1991 by Michael C. Sierzchula, located two previously unknown archeological sites. MCRA recommends that the dredging be done from the north bank to avoid impacting the archeological sites. If this is not feasible then the two sites should be tested for National Register of Historic Places significance.

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INTRODUCTION

Project Area Location and History

The U.S. Army Corps of Engineers, Memphis District requested MCRA develop a budget and survey plan to investigate approximately one mile of creek bank along Sals Creek Ditch (both sides). The plan and budget were submitted and accepted, and Delivery Order #3 issued (contract no. DACW66 91 D-0111). Work was conducted by Michael Sierzchula and Karl Sandrock.

The project area is in Scott County, Missouri (Figure 1). It extends west from the confluence of Sals and Ramsey creeks approximately one mile.

Project Area Description and Disturbance

Sals Creek is a ditched water course flowing from southwest to northeast. The present creek channel retains the characteristics it had before ditching in 1952 (personal communication, Donny Howser). The project area is 200 feet wide on the north and south sides of the creek. On the north side of the ditch, the spoil pile occupies the outside 100 feet of the project right-of-way (ROW), effectively removing that portion from inspection. The surface is flat on the north side, between the present creek bank and the spoil pile. The north side of the ditch, east to the area known as the "rock cut", is in pasture. From the west side of the "rock cut", east to the end of the project area, the spoil pile covers the entire project area and is wooded. In the area covered with pasture, surface visibility was basically 0%. Small, localized areas had approximately 10% visibility.

During interviews, area farmers Donny Howser and Jim Hess indicated that much of the flat ground surface on the north side of the ditch was recent deposits (post 1952). Both said that a deep (no depth noted) ditch, beginning at the fence on the south side to within 50 feet of the base of the spoil pile, was excavated. Bedrock was exposed in several places at the base of the ditch. In addition, recent flooding of Sals Creek has left up to 2 inches of silt/mud in areas affected by high water. This would indicate that the intact surface on the north side of the ditch may be buried under an undetermined amount of alluvium.

The south side of the project area is marked by steep slope, three drainages entering Sals Creek, and varying survey conditions. Two unnamed drainages enter Sals Creek at the west end of the project area. Ramsey Creek marks the east boundary of the project area. The area from Ramsey Creek west to the west side of the "rock cut" (approximately .24 miles) is pasture. A single N/S terrace is present. Surface visibility at the lower elevation (floodplain of Ramsey Creek) was 0%. A surface visibility of 20-40% was present along the fenceline and cattle path, and on areally restricted spots on the terrace slope. Surface visibility was 100% along the banks of a minor drainage near the west end of the pasture. The only known forms of disturbance in this area are the timbering and farming.

A small unnamed drainage rapidly descends from the uplands at the approximate midpoint of the project area. About .12 miles of flat ground with 0% visibility surrounds the creek and are being used as pasture. The creek is deeply entrenched and 100% surface visibility was recorded on the creek bank.

A unnamed drainage is near the west boundary of the project area. In this instance two smaller drainages come together to form one that empties into Sals Creek. The flat ground surface associated with this drainage is approximately .23 miles long. The primary use of this area is pasture, although a trailer, numerous outbuildings, and cattle feeding areas are present. Surface visibility was 0% in most areas, with 100% visibility around the feeding areas and along the creek bank, 20% along the fenceline and restricted spots in the pasture and 30-40% in the field road through the area. The owner (Mr. Jim Hess) of this ground has modified the surface to facilitate drainage and raise the elevation of outbuildings. All modification has taken place in the central part of the area around the creek. The ground surface has been raised under the two buildings east of the creek, using soil from Sals Creek. In

addition, the land surface between the two building (east of the drainage) has been modified to remove standing water. Limited land modification has taken place around buildings west of the drainage. Mr. Hess pointed out an early dirt road along the west side of the flat ground at the base of the slope.

A steep, wooded slope marked the south side of Sals Creek, between the drainages. Surface visibility was 0% with rock outcropping throughout this area. Mr. Hess noted that, as part of the construction of the ditch, the entire slope was stripped of vegetation and all topsoil bulldozed to the base of the slope. Bedrock was exposed in all areas. He said that the slope was steep enough that the bulldozers backed up the steep slope, because they were unable to turn around at the edge of the project area.

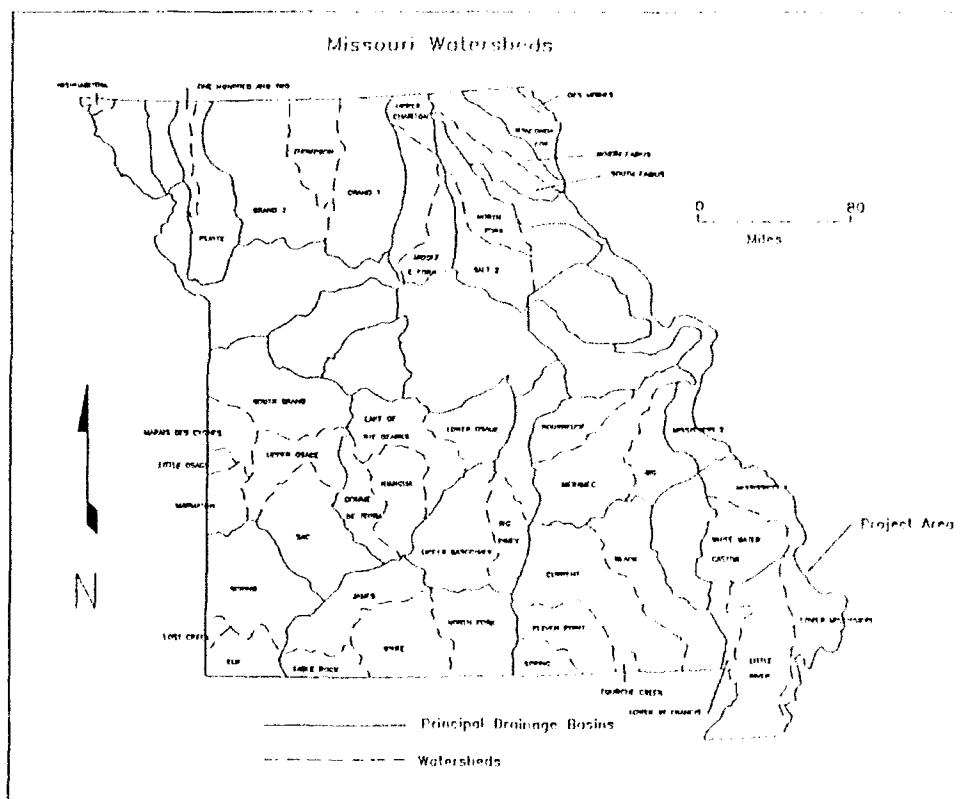


Figure 1. Project area.

PHYSIOGRAPHIC ENVIRONMENT

The Sals Creek Enlargement Project area is located in the Advance Lowlands adjacent to Crowley's Ridge. Just west of the project area, the Advance Lowlands cuts through Crowley's Ridge. At present, there is no major stream in this lowland. Although in Terminal Pleistocene times the Mississippi River raged through this gap, capturing the Ohio at New Madrid, the south end of Sikeston Ridge. The Castor River is the northernmost river of three that join the Western and Eastern Lowland physiographic region, part of the St. Francis Basin of the Central Mississippi River Valley (Figure 2; Morse and Morse 1983). The St. Francis River cuts through Crowley's Ridge near the Arkansas-Missouri border. The L'Angeuille River cuts through Crowley's Ridge northwest of Helena, Arkansas before emptying into the Mississippi.

This portion of the Mississippian Embayment is a deeply incised canyon, which has alluviated since the beginning of the Holocene. The Mississippi Valley, 80 miles wide at the project area, is divided about in half by Sikeston Ridge (Medford 1972:69). Crowley's Ridge separates the western quarter of the valley and defines the old Mississippi River course. The Castor Gap is one to two miles wide and cuts 15 miles through Crowley's Ridge.

The Mississippi River has formed the structure of the environment, first by carving this great valley, and more recently by depositing nearly a mile of fine grained alluvium within its confining rock walls. The alluvium is largely free of rock and stone with the largest common sediment size being sands deposited in the alluvial levees. This has resulted in the formation of some of the world's best and most extensive agricultural land, which has virtually no hard rocks or minerals. Prehistorically, and even today, rocks and minerals had to be imported from the surrounding regions, especially Crowley's Ridge.

Crowley's Ridge was laid down in Tertiary and Cretaceous times as terraces of the Mississippi River and the Ohio River. At that time the Ohio River had not been captured by the Mississippi and it occupied the Eastern Lowlands, while the Mississippi occupied the Western Lowlands. North of the St. Francis River, the terraces overlay limestone which is visible as weathered limestone spires in a few road cuts at the extreme north end of the ridge. These formations were very much in evidence on the south side of the project area. The upper terraces were laid down by rapidly moving water and contain many cobbles of virtually every kind of hard-grained stone occurring in the whole Mississippi Basin. These were important resources for the Stone Age peoples of the lowlands.

The modern topography is a product of glacial meltwater during the Pleistocene. These changes were complex and are not completely understood, dated, or agreed upon. The events of the Nebraskan, Kansan, and Illinoian glaciations and Interglacial are especially obscure in the Bootheel region, having been dissected and/or masked by the Wisconsin age events or sediments, respectively. During the first part of the Pleistocene it is believed that the Mississippi was on the west of Crowley's Ridge and the Ohio on the east.

Two advances and retreats of the Wisconsin glacier have been identified. The earliest retreat took place ca. 90,000 B.P. and the Mississippi laid down massive amounts of alluvium in the Western Lowlands. The Ohio, at that time presumably flowing through the Cache Valley, laid down Sikeston Ridge (Saucier 1974). Once again the massive ice sheets advanced, and the outwash slackened until ca. 20,000 B.P. The glaciers again began melting, and recent data suggest that some stages of the melting resulted in catastrophic flooding (Monestiesky 1989:213). In the upper Mississippi Valley where the river was confined between the canyon walls, its speed was apparently fast enough to transport cobbles. When this massive flood reached the Saint Francis Valley where the valley doubled in size, a great mass was deposited around Puxico, forming a dam and creating a lake from Cape Girardeau to Puxico, a distance of 50 miles (Hawker 1987:60). This is evidenced by the fact that the average valley floor elevation is 340 feet above mean sea level (AMSL) at Puxico and Cape Girardeau, and the Castor Valley. Just below Puxico the valley floor drops to 325 feet AMSL with a 50 foot drop in elevation between Poplar Bluff and Pocahtontas, 50 miles away.

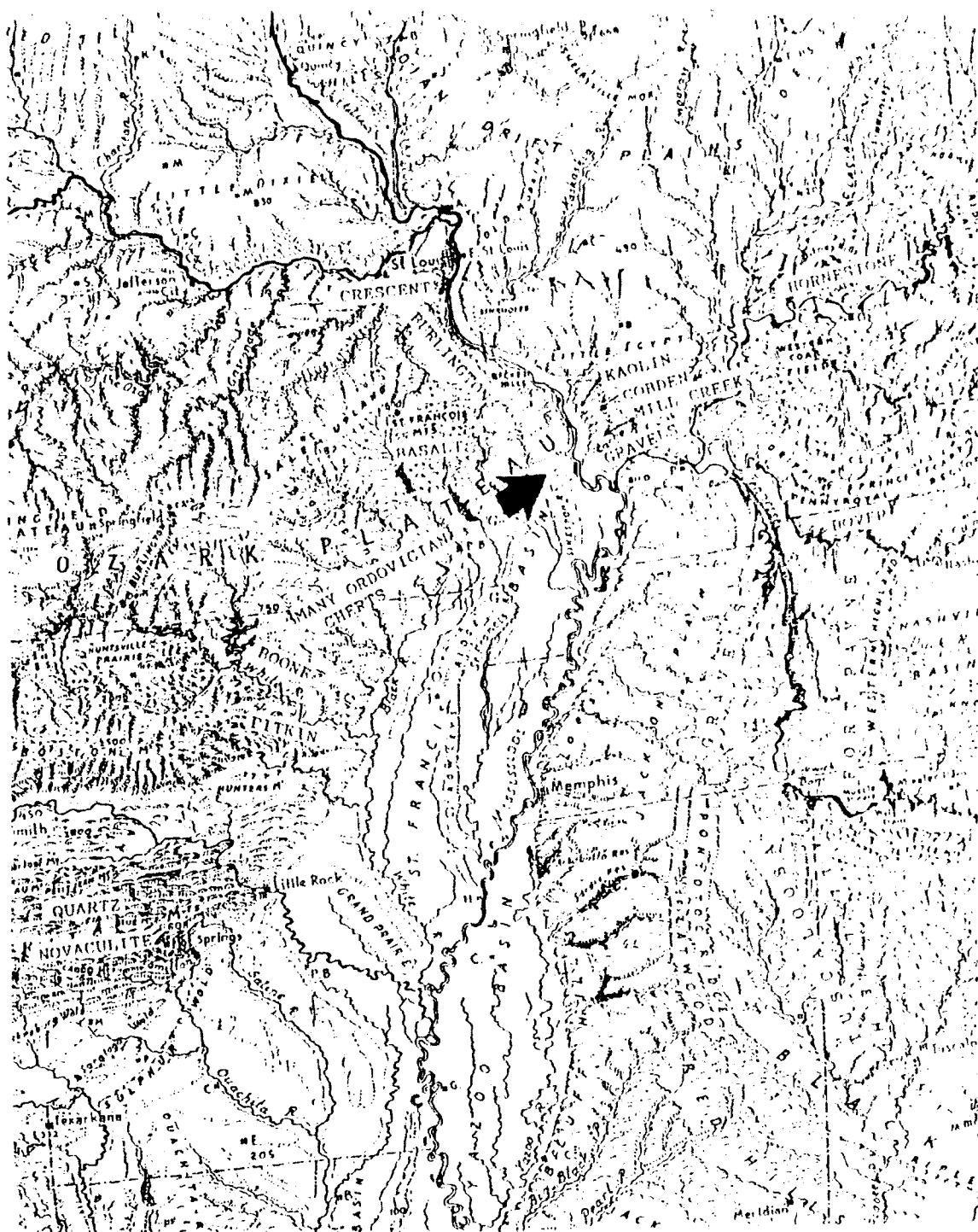


Figure 2. Central Mississippi River Valley physiography and major important lithic sources (after Raiez 1978).

The lake overtopped Crowley's Ridge, cut both the Castor River Valley and, later, the major cut of what was to become the Morehouse Lowlands, just west of the project area, and began the braided regime which laid down the terminal Pleistocene alluvium of the Malden Plain and Morehouse Lowlands. The final major change in the topography of Crowley's Ridge was the topping of the ridge at Thebes Gap and the capturing of the Ohio near Cairo. It is possible that this topping was the result of a meltwater surge, perhaps from Lake Agassie, which deposited the Charleston Delta on the east side of Sikeston Ridge. After this final outpouring of water and debris, the glacial retreat had moved so far north that it was beyond the Mississippi Basin. Slowly, the dusty braided surface changed to a meandering regime and vegetation became established.

The Mississippi River has also structured, and continues to structure, the transportation environment. The dominant direction of its movement from north to south has resulted in making resources upstream more accessible than those to the east or, especially, to the west. For example, in order to cross the valley at 36 degrees north latitude one must traverse three major rivers in addition to the Mississippi itself: the St. Francis, the Cache and the Black, all former channels of the Mississippi River in post-Pleistocene times. In pre-automobile times, this was a tedious overland journey of 80 miles which involved crossing many bodies of water. This contrasts with 100 miles of floating downhill on the surface of the river. The river is still a major transportation artery for the central part of the continent, and in earlier times it was the only way to easily traverse this lowland region. In 1840-1843 when the General Land Office (GLO) maps were made, all of the mapped settlements in the project area were positioned along the river.

The central Mississippi River Valley is incised into the Ozark and Cumberland Plateaus (Figure 3). These coordinate proveniences were uplifted from the south by a tectonic plate movement from the southeast which pushed up the Ouachita Mountains and split the lower part of the Ozark-Cumberland plateau. At the time of this tectonic event, ca. 100 million years ago, these plateaus were inland seas with beachlines along the present course of the Boston Mountains in Central Arkansas and Sand Mountain-Walden Ridge in Alabama and Tennessee. These ancient sea beds are today limestones filled with many different kinds of cherts. While these cherts come from several different formations, there is a great deal of variation within formations, which is made more confusing by the tendency for these formations to have different names in different states. For example the Boone, Burlington and Fort Payne "formations" are different names applied to the same formation in Arkansas, Missouri, and Tennessee, respectively. There is a great deal of variation present within this structure, and more formations than the above contain usable cherts. Figure 2 shows the source area of some of the more important lithic resources. Some of these have well known source areas, such as Dover, Mill Creek, Crescent and Illinois Hornstone. Other lithic resources occur over large areas and do not have known quarries, though they may exist (Butler and May 1984).

Making the identification of these lithic resources more complex is the presence of Tertiary gravel beds around the edges of the Mississippian Embayment, on Sikeston and on Crowley's Ridge. Crowley's Ridge is perhaps the most important of these because it occurs in the center of this stoneless plain. This deposit was laid down in Pliocene times when the river gradient was steeper than it is today. This deposit has virtually every heavy hard kind of mineral which occurs in the Mississippi River Basin. Prehistoric sites on the edge of the Western Lowlands, even those situated directly on the Grandglaise Terrace, show a marked preference for the lithics found in the Ozarks over those of the terrace (eg. 3IN17, Lafferty et al. 1981). Much of the gravel deposits adjacent to the Mississippi Valley to the east is covered with Loess deposits up to 200 feet thick. Investigations have shown that, as one approaches Crowley's Ridge from both the east and the west, there is a marked increase in the occurrence of cobble chert on prehistoric sites (Shaw 1981). This is generally true even though, through time, there are documented changes in the prehistoric utilization of different lithic resources (Hemmings 1982; Lafferty 1984). Crowley's Ridge is currently the main source of gravel for both the Eastern and Western Lowlands. The rather intensive modern day use of gravel sometimes makes the identification of aboriginal tools from "gravel crusher-produced artifacts" difficult. Since the Castor River was one of only three rivers to cut through Crowley's Ridge, we would expect this to be a major lithic source area. Because it

was, and still is, navigable by small craft, and because the river abuts the ridge and erodes the gravel deposits, these are more accessible than at other smaller streams which have their source on the ridge.

One important class of lithic resources was the volcanic materials, particularly the basalts (for axes) which were obtained in the St. Francis Mountains. Also of importance from this quarter were rhyolite and orthoquartzite, which were used for various tools (Price and Price 1984:40-43; Morse and Morse 1983). The Castor River has its source in these deposits and the presence of both of these kinds of resources is to be expected on archeological sites.

When De Soto and his men reached the Great River in 1541 they looked upon a great transportation artery that stretched from the Gulf of Mexico to the heart of the continent. However, it was navigated and controlled by native Americans in fleets of dugout canoes who both harassed and assisted the Spanish over the next several years. As they looked from the bluffs over the swampland of virgin forest, the Spaniards never suspected that they were gazing upon both the graveyard and salvation of their expedition. Most of the next two months found them slogging through one of the most difficult swamps encountered in the entire expedition: the St. Francis Sunk Lands (Morse 1981; Hudson 1984). However, the expedition was continually drawn back to the Great River and the high chiefdom cultures, which the Spanish dominated with the techniques used so effectively against the Aztecs and the Inca. The swampy lowlands impeded the expedition particularly when traversing from east to west. As the Spanish reached the Grandglaise terraces on the Ozark Escarpment, they encountered the great Toltec - Cahokia road, later to be known, sequentially, as the Natchitoches Trace, the Southwest Military Road, and, currently, U.S. Hwy. 67). This important road was on tractable ground with the swampy lowlands to the east and the more dissected plateau to the west. The expedition's speed doubled once they were on it. In the end, after many more side trips and high adventures, the hard pressed expedition made its escape down the Great River in boats constructed with nails forged from their weapons. They were harassed by the Indians in large fleets of canoes all the way to the Gulf of Mexico.

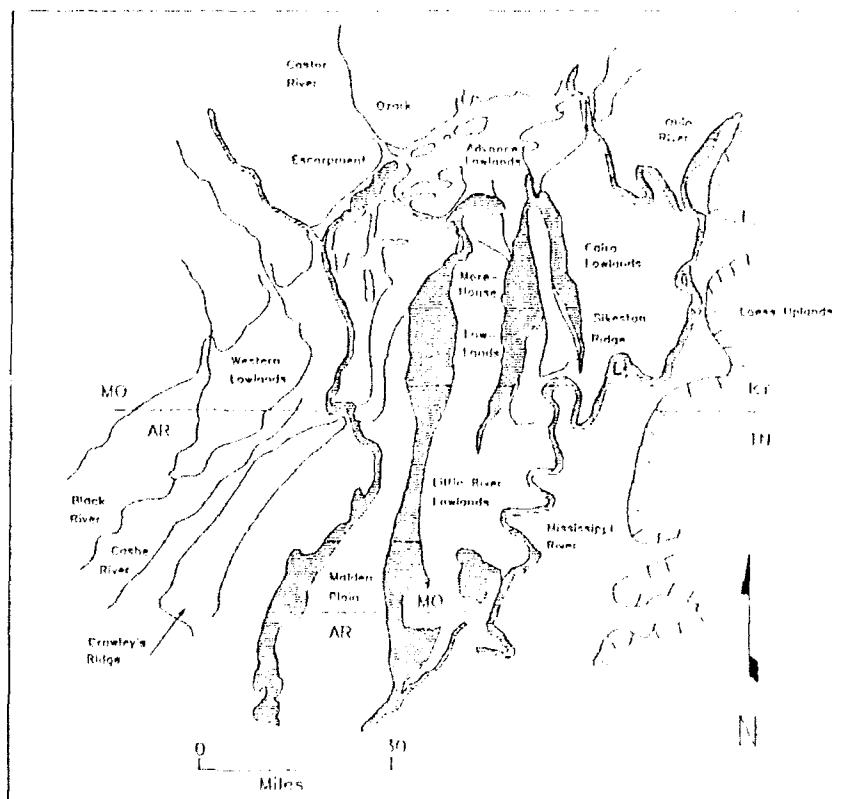


Figure 3. Major landforms in the Central Mississippi Valley area.

The early Euro-American penetration into this area followed Crowley's Ridge into the center of the Lower Mississippi Valley (Dekin et al. 1978). This was also the route of the first railroad into the valley from St. Louis. Therefore, the physiography of the Central Mississippi River has, to a large extent, dictated the nature of life in this environment. Transportation by water was much easier though sometimes it involved a longer trip, particularly the Mississippi. Overland travel was easiest by going around the lowlands or down Crowley's Ridge. Humans (*Homo sapiens*) did not penetrate or live in this environment unless they were equipped with boats, lines, and other tools with which to deal with an aquatic environment. This lowland forest was rich in plants and animals and contained some of the most productive soils on the continent. Too, there was a great profusion of mineral resources in and about the nearby uplands.

The structure of the regional physiography makes the project location the crossroads of a major north-south overland route, from the Ozark Uplands to New Madrid. It has important lithic resources which were necessary for importations to the lowlands during prehistoric times.

SOILS

The relict braided surface was laid down about 10,000 years ago by loads carried from the melt-water from the Wisconsin glaciation (cf. Saucier 1974; Morse and Morse 1983). These fine grained deposits settled in the slow moving water of an estuary. The valley bottom at Sals Creek has been a relatively stable surface for ca. 8000 years.

The Soil Conservation Service's soil manual for Cape Girardeau, Mississippi and Scott Counties, Mo. was used to identify three types of soil in the project area. The soils are Adler silt loam and Memphis silt loam on the south of Sals Creek and Orthents-Water complex on the north.

Adler silt loam belongs to the Adler-Falaya soil association. The majority of this association is north of Sals Creek. The Adler series of soils are along drainages in the uplands and on old flood plains next to the uplands. South of the creek, Adler silt loam is the primary soil type on which 23ST221 and 23ST222 are located. Adler silt loam has moderate draining abilities and moderate permeability.

Memphis silt loam is found adjacent to the Adler silt loam on the south side of Sals Creek. Like Adler silt loam the drainage and permeability is moderate. The Memphis series of soils have slope ranges of 2 to 40 percent, whereas the Adler series have slope range of 0 to 2 percent.

Along the north side of Sals Creek, interrupting the Adler-Falaya association, is part of the Orthents-Water complex. This complex consists of the levee that parallels the Mississippi River. Also, borrow pits from which the levee was built is included in this complex.

SOILS AND BIOTIC COMMUNITIES

The relationship of biota to riverine features in the Lower Mississippi Valley is well known (Lewis 1974; Lafferty 1977; Butler 1978; Morse 1981). Because of the radical changes in the environment in the past century, all of these studies are reconstructions based on named witness trees in the GLO survey notes. These studies have consistently identified plant communities associated with particular soil types.

There are two plant communities associated with the levees: the Sweetgum-Elm Cane Ridge forest and the Cottonwood-Sycamore Natural Levee forest. These plant communities were the driest environments in the natural landscape and had a high potential for human settlement. These two plant communities are, in fact, successional stages, with the Cottonwood-Sycamore forest being found along active river channels, and the Cane Ridge Forest on the levees of abandoned courses.

There are four aquatic biotic communities: river, lake, marsh, and swamp. All are low-lying areas unsuitable for human occupation. Several are involved in successional sequences; however, since about the Middle Woodland period all were present at any given time, prior to drainage.

Between the two extremes of upland levees and aquatic communities are river edge communities and seasonal swamps. In drier times the latter contained areas suitable for occupation. The former are a line-like interface with a steep slope and little substantial flat area.

The correlation between soils and plant communities is not a 1:1 ratio. These soil deposits build up, and what was once a swamp may, in a few decades, be a dry levee. This process brings about successional biotic changes. There is, however, a high correlation between soils and last successional stage plant communities.

Research using soils and plant communities to model prehistoric occupation in northeast Arkansas (Dekin et al. 1978; Morse 1981; Lafferty et al. 1984), in the adjacent portions of the Missouri Bootheel (Lewis 1974; Price and Price 1981), and in the lower Ohio Valley (Muller 1978; Lafferty 1977; Butler 1978) have all suggested that sites are preferentially located on levee soils and are not found in aquatic deposits.

MACROBIOTIC COMMUNITIES

These three "macrobiotic" communities - levee, ecotone, and swamp, are composed of different species of plants and animals. Table 1 presents an arboreal species composition reconstructed in Mississippi County, Missouri (Lewis 1974:19-28).

Levee

The Levee macrobiotic community includes two plant communities: the Cottonwood-Sycamore community found along the active river channel and the Sweetgum-Elm Cane Ridge forest on abandoned courses. The arboreal species found in the Sweetgum-Elm community include all of the species found along the natural levee, however, their mix is considerably different. These two communities are in the highest topographic position in the county and supported a dense understory of plants including cane (*Arundinaria gigantea*), spice bush (*Lindera benzoin*), pawpaw (*Asimina triloba*), trumpet creeper (*Campsis radicans*), red bud (*Cercis canadensis*), greenbrier (*Smilax* sp.), poison ivy (*Rhus radicans*) and several less frequent herbaceous plants. Most common of these was cane, which often formed nearly impenetrable canebrakes. Canebrakes provided cover for many of the larger species of land animals and were an important source of weaving and construction material.

The major mammals in this biotic community include white-tailed deer (*Odocoileus virginianus*), cougar (*Felis concolor*), black bear (*Ursus americanus*), elk (*Cervus canadensis*), skunk (*Mephitis mephitis*), opossum (*Didelphus marsupialis*), raccoon (*Procyon lotor*), eastern cottontail rabbit (*Sylvilagus floridanus*), gray fox (*Urocyon cinereoargenteus*), and gray squirrel (*Sciurus carolinensis*). Important avian species include wild turkey (*Meleagris gallopavo*), prairie chicken (*Tympanuchus cupido*), ruffed grouse (*Linderaosnasa umbellus*), passenger pigeon (*Ectopistis migratorius*) and carolina parakeet (*Conuropsis carolinensis*).

Table 1. Arboreal Species Composition of Three Biotic Communities
in Mississippi County, Missouri.

Species	Levee	Edge	Swamp
American Elm (<i>Ulmus</i> sp.)	23	19	
Ash (<i>Fraxinus</i> sp.)	11	14	2
Bald Cypress (<i>Taxodium distichum</i>)	7	50	
Black Gum (<i>Nyssa sylvatica</i>)	T	1	
Blackhaw (<i>Viburnum</i> sp.)	T		
Black Walnut (<i>Juglans nigra</i>)	2		
Box Elder (<i>Acer negundo</i>)	2		
Cherry (<i>Prunus</i> sp.)	T		
Cottonwood (<i>Populus</i> sp.)	1	3	
Dogwood (<i>Cornus</i> sp.)	1		
Hackberry (<i>Celtis occidentalis</i>)	12	9	
Hickory, (<i>Carya</i> sp.)	5	4	
Shellbark (<i>Carya laciniosa</i>)	T		
Hornbeam (<i>Ostrya virginiana</i>)	2		
Kentucky Coffee Tree (<i>Gymnocladus dioica</i>)	T		
Locust, ?	T		
Black (<i>Robinia pseudoacac</i>)	T		
Honey (<i>Gleditsia triancan</i>)	T	1	14
Maple, (<i>Acer</i> sp.)	3	8	
Sugar (<i>Acer saccharum</i>)	1		
Oak, Black (<i>Quercus velutina</i>)	5	2	
Burr (<i>Quercus macrocarpa</i>)	1	3	2
Overcup (<i>Quercus lyrata</i>)	1		
Post (<i>Quercus stellata</i>)	T		
Red (<i>Quercus rubra</i>)	1	1	
Spanish (<i>Quercus falcata</i>)	1		
Swamp (<i>Quercus bicolor</i>)	T	1	
White (<i>Quercus alba</i>)	1	1	
Pecan (<i>Carya illinoensis</i>)	1	1	
Persimmon (<i>Diospyros virginiana</i>)	T	2	2
Plum (<i>Prunus</i> sp.)	T		
Red Haw (<i>Crataegus</i> sp.)	T	1	11
Red Mulberry (<i>Morus rubra</i>)	T		
Sassafras (<i>Sassafras albidum</i>)	T		
Sweetgum (<i>Liquidamber styraciflua</i>)	20	18	
Sycamore (<i>Platanus occidentalis</i>)	1		
Willow (<i>Silix</i> sp.)	1	2	18

Abbreviations: T=Trace (i.e. <1%); Data based on Lewis (1974:18-28).

Prior to artificial levee construction, the natural levees were the best farmland in this environment because they are located at the highest elevations from which spring floods rapidly receded and drained. This environment provided a large number of useful species of plants and animals, making it an attractive place for settlement at virtually all times (except during major floods) since the levees' formation.

Levee/Swamp Ecotone

This modeled macrobiotic community is what Lewis (1974:24-25) has called the Sweetgum Elm-Cypress seasonal swamp. This ecotone had few species present at any one time and a noticeably clear understory. The arboreal species composition (Table 1) includes more water-tolerant species (cypress, willow, and red haw) and at times had aquatic animal species. These areas were flooded regularly every year for several weeks to several months, and the soils retained the moisture longer than levee soils. These locations were clearly much less desirable for occupation than the levees, but they were easy to traverse in dry periods.

Diverse fauna, drawn from the adjacent swamps and levees, occupied the area at different seasons. In addition, the giant swamp rabbit (*Sylvilagus aquaticus*) and crayfish preferred this ecotone as a habitat. It is probable that many aquatic species, such as fish, were stranded and scavenged by the forest's omnivores when this environment changed from wetland to dry open swampscape. Characteristically, the soils are poorly drained due to the presence of clays in the upper horizons. Normally aquatic trees, especially cypress, would have been exploitable in this environment with land-based technology.

Swamp

Included in these modeled strata are the different environments that were under water prior to drainage, as defined by the soils deposited in slackwater conditions. These soils occur at the lowest elevation in the project area. Before drainage the following ecozones were included under this rubric: river channels, lakes, marsh and Cypress deep swamp. These ecozones are successional stages in this environment, but all are aquatic. The Cypress deep swamp (Table 1) is only one of the three having arboreal species.

Several important herbaceous species were found in these aquatic environments. These included cattails (*Typha latifolia*), various grape vines (*Vitis* sp.), button bush (*Cephalanthus occidentalis*), and hibiscus (*Hibiscus* sp.), which was an important source of salt (Morse and Morse 1980).

The fauna of the aquatic environment were quite different from the terrestrial species, which mostly penetrated only the swamp edge. Beaver, mink, and otter were important swamp mammals. Of special interest were fish and waterfowl, abundant in this great riverine flyway. But, a means of water transportation was necessary to exploit these resources. Although dugout canoes have been dated to at least 1,000 B.C., it is likely that they may have occurred a great deal earlier.

In summary, this has been a rich environment for a long period of time. The project area contained, at different times, all of the major environments found in the Lower Mississippi Valley. During much of late prehistoric times it was on a major interface between a very large backwater swamp to the west and the well-drained Mississippi River levees. Cutting through these large scale formations is Pemiscot Bayou, whose fluviality has created smaller scale levees and swamps.

UPLAND BIOTA

The Sals Creek area has more upland species of native plants and animals than do the surrounding lowlands (cf. Felton 1975). There are a few streams which have cut across the surface. Even in the more poorly drained locations, where today one sees standing water in the soybeans, prehistorically there would have been more water taken up by the canopy and roots of the trees. Species composition in the three parcels of woods observed were typical of Oak-Hickory (*Carya* *sps.* - *Quercus* *sps.*) forest (Shelford 1963; Kuchler 1964) with a notable absence of Southern Flood Plain species such as bald cypress (*Taxodium distichum*), which occurs along the river bank.

Crowley's Ridge possesses unique plant communities in the mid continent (Arkansas Natural Plan 1978). It is the western limit for certain eastern species such as the tulip poplar (*Liriodendron tulipifera*) and Beech (*Fagus grandifolia*) (Harlow and Harrar 1968:284,365). The tulip poplar was a preferred wood among the southeastern Indians for making the largest canoes (Lafferty 1977), and it would have been in high demand by the peoples of the Eastern and Western Lowlands where it did not grow.

There is considerable evidence that the environment has undergone substantial changes through the past 10,000 years (cf. Delcourt et al. 1980). Major changes involve the general warming with the retreat of the Wisconsin glaciers, a long period of desiccation during the Middle Archaic period and since then wetter climates similar to the present. Morse and Morse (1983) have detailed these changes in the region.

PREVIOUS RESEARCH

Archeological research has been carried out in Scott and adjacent counties for nearly a century. As with much of the Mississippi Valley, the earliest work was done by the Smithsonian Mound Exploration Project (Thomas 1894). Since that time a great deal of work has been done in the Bootheel region of the Central Mississippi Valley area (cf. Willey and Phillips 1958 for definitions of technical terms), resulting in several extensive syntheses of the region's prehistory (Morse and Morse 1983; Chapman 1975, 1980). In this chapter we summarize the archeological research which has taken place, what is known of the prehistory of the region, and the limits in these data as they apply to the Sals Creek locality. Finally, we outline major research questions which directly relate to the data base recovered in this project.

The earliest professional archeological work in the region was the work carried out by the Smithsonian Institute mound exploration project (Table 2). Thomas (1894) and his associates excavated at three sites near the project area: Pecan Point, a Nodena phase site, Sherman mounds and the Jackson mounds. These Mississippi period sites were located outside the project area. Principally excavation in large mound sites, the work identified the American Indians as the authors of the great earthworks of the eastern United States.

Most of the early work was concerned with specimen collection for museums (e.g., Potter 1880; Moore 1910; Fowke 1910). Some data were used to define the great ceramic traditions, including the Mississippian tradition, in the eastern United States (Holmes 1903). Many of these original conceptualizations remain the basis upon which our current chronologies are structured (e.g. Ford and Willey 1941; Griffin 1952; Chapman 1952, 1980).

Table 2. Previous Archeological Investigations in Northeast Arkansas and Southeast Missouri.

<u>Investigator</u>	<u>Location and Contribution</u>
Potter 1880	Archeological investigations in southeast Missouri.
Evers 1880	Study of pottery of southeast Missouri.
Thomas 1894	Mound exploration in many of the large mound sites in southeast Missouri and northeast Arkansas.
Fowke 1910	Mound excavation in the Morehouse Lowlands.
Moore 1910, 1911 1916	Excavation of large sites along the Mississippi, St. Francis, White, and Black Rivers.
Adams and Walker 1942	Survey of New Madrid County.
Walker and Adams 1946	Excavation of houses and palisade at the Mathews site.
Phillips, Ford, and Griffin 1951; Phillips 1970	Mapping and sampling of selected sites in southeast Missouri, and northeast Arkansas, Lower Mississippi Valley Survey (LMVS), proposed ceramic chronology.
S. Williams 1954	Survey and excavation at several major sites in southeast Missouri, original definition of several Woodland and Mississippi phases.
Chapman and Anderson 1955	Excavation at the Campbell site, a large Late Mississippian Village in southeast Missouri.
Moselage 1962	Excavation at the Lawhorn site, a large Middle Mississippian Village in northeast Arkansas.
J. Williams 1964	Synthesis of fortified Indian villages in southeast Missouri.
Marshall 1965	Survey along I55 route, located and tested many sites north of the project area.
Morse 1968	Initial testing of Zebree and Buckeye Landing Sites.
J. Williams 1968	Salvage of sites in connection with land leveling, Little River Lowlands.
Redfield 1971	Dalton survey in Arkansas and Missouri Morehouse Lowlands.

Table 2 (continued). Previous Archeological Investigations.

<u>Investigator</u>	<u>Location and Contribution</u>
Schiffer & House 1975	Cache River survey.
Price et al. 1975	Little Black River survey.
Morse and Morse 1976	Preliminary report on Zebree excavations.
Chapman et al. 1977	Investigations at Lilbourn, Sikeston Ridge.
Harris 1977	Survey along Ditch 19, Dunklin County, Missouri.
Klinger and Mathis 1978	St. Francis II cultural resource survey in Craighead and Poinsett Counties, Arkansas.
LeeDecker 1978	Cultural resources survey, Wappapello to Crowley's Ridge.
Padgett 1978	Initial cultural resource survey of the Arkansas Power and Light Company transmission line from Keo to Dell, Arkansas.
I. R. I. 1978	Cultural resources survey and testing, Castor River enlargement project.
Dekin et al. 1978	Cultural resources overview and predictive model, St. Francis Basin.
LeeDecker 1979	Cultural resources survey, Ditch 29, Dunklin County, Missouri.
Morse 1979	Cultural resource survey inside Big Lake National Wildlife Refuge.
LeeDecker 1980a	Cultural resource survey, Ditch 81 control structure repairs.
LeeDecker 1980b	Cultural resources survey, Upper Buffalo Creek Ditch, Dunklin County, Missouri, and Mississippi County, Arkansas.
Morse and Morse 1980	Final report to COE on Zebree project.
J.Price 1980	Archeological investigations at 230U244, limited activity Barnes site, Dunklin County, Missouri.

Table 2 (continued). Previous Archeological Investigations.

<u>Investigator</u>	<u>Location and Contribution</u>
Price and Price 1980	A predictive model of archeological site frequency, transmission line, Dunklin County, Missouri.
Lafferty 1981	Cultural resource survey of route changes in AP&L Keo-Dell transmission line.
Klinger 1982	Mitigation of Mangrum site.
Santeford 1982	Testing of 3CG713.
Bennett and Higginbotham 1983	Mitigation at 23DU227, Late Archaic through Mississippi period site.
Keller 1983	Cultural resources survey and literature review of Belle Fountain Ditch and tributaries.
Price and Price 1984	Testing Shell Lake Site, Lake Wappapello.
Chapman 1975, 1980	Synthesis of Archeology of Missouri.
Morse and Morse 1983	Synthesis of Central Mississippi Valley prehistory.
Lafferty et al. 1984, 1985	Cultural resource survey, testing and predictive model, Tyronza Watershed, Mississippi County, Arkansas.
Lafferty & Sierzchula 1986	Cultural Resources Survey and Record Check, Belle Fountain Ditch, Pemiscot and Dunklin Counties, Missouri.
Lafferty et al. 1987	Cultural resources survey and testing, pollen cores and geomorphic reconstruction, Ditch 29, Mississippi County, Arkansas.
Teltser 1988	Controlled surface collections on three sites, Stoddard and Dunklin Counties, Missouri.
Lafferty and Cande 1989	Cultural resources survey and testing Eaker Air Force Base Mississippi County, Arkansas.
Wadleigh and Thompson 1989	Proton Magnetometer survey, 3MS105, Eaker Air Force Base, Mississippi County, Arkansas.

There was a hiatus in the region's archeological work until the 1940s when Adams and Walker began the first modern archeological work for the University of Missouri (Adams and Walker 1942; Walker and Adams 1946). Beginning in 1939 the Lower Mississippi Valley Survey (LMVS) conducted a number of test excavations at many of the large sites in the region (Phillips, Ford, and Griffin 1951; S. Williams 1954). This work has continued to date in different parts of the valley (e.g., Phillips 1970; S. Williams 1984). The LMVS has produced definitions for numerous ceramic types in the Lower Mississippi Valley area and produced the first phase definitions for many of the archeological manifestations known in the latter part of the archeological record, particularly the Barnes, Baytown, and Mississippian traditions of the north (S. Williams 1954).





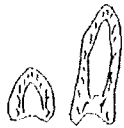
In the 1960s the tempo and scope of archeological work in the region increased. Numerous survey and testing projects were carried out for proposed federally funded projects (Marshall 1965; Williams 1968; Hopgood 1969; Krakker 1977; Gilmore 1979; IRI 1978; Dekin et al. 1978; Lafferty 1981; Morse and Morse 1976, 1980; Morse 1979; Klinger and Mathis 1978; Klinger 1982; Padgett 1978; C. Price 1976, 1979, 1980; J. Price 1976a, 1976b, 1978; Greer 1978; LeeDecker 1979; Price, Morrow and Price 1978; Price and Price 1980; Santeford 1982; Sjoberg 1976; McNeil 1982, 1984; Klinger et al. 1981). Generally referred to as cultural resources management studies, these projects have greatly expanded the number of known sites from all periods of time and accumulated an extensive body of data on the variation present on a range of different sites.

R.A. Marshall located, ca. 1965, recorded three sites in Scott county near the project area. Two of the sites, 23ST113 and 23ST114, had two mounds on each of the sites. These sites were located on top of hills in the current project area. The other site, 23ST115, was located at the base of another hill in the current project area (Missouri ARchaeological Society).

As well as small-scale archeological projects, the large-scale excavation projects were continued in the region. Major excavations at the Campbell site (Chapman and Anderson 1955), Lawhorn (Moselage 1962), Snodgrass site (Price 1973; Price and Griffin 1979), Lilbourn (Chapman et al. 1977; Cottier 1977a, 1977b; Cottier and Southard 1977), and Zebree (Morse and Morse 1976, 1980) have greatly expanded our understanding of the Mississippian cultures. This understanding has resulted in the definition of the temporal/spatial borders between different Woodland and Mississippian manifestations and has resulted in definitions of assemblages. Several major syntheses have resulted (Chapman 1975, 1980; Morse 1982a, 1982b; Morse and Morse 1983) which provide up-to-date summaries and interpretations of the region's archeological work.

The Zebree archeological project was one of the largest excavation projects conducted in Arkansas. Over a period of eight years, large parts of this site were excavated. The excavations resulted in, among other things, the definition of the Big Lake phase and produced much data on the Barnes culture (see below for more discussion of these archeological manifestations).

In 1987 MCRA completed a survey and testing project on Ditch 29, which is located just north of Eaker Air Force Base on the Missouri and Arkansas border (Lafferty et al. 1987). This work included a deep pollen core from Pemiscot Bayou and a geomorphic reconstruction which happened to include the present project area (Guccione, Lafferty and Cummings 1988:71).

Time Scale	Cultural Stages	Cultures & Phases	Associated Artifacts and Traits	
1541	Historic	American European Historic Indian	Wide spread trade, machine produces artifacts, glass glazed pottery, wide spread use of metals	
1000	Mississippian	Nodena Parkin Cherry Valley Lawhorn Big Lake	Polisaded villages with temple mounds, and satellite hamlets & farmsteads, arrow points, intensive farming, shell tempered pottery, wide spread riverine trade, food storage, stone hoes, rectangular cells	
AD 0 BC 500	Woodland	Bornes Baytown Marksville Tchula	Beginning of agriculture, pottery making (sand and grog tempered), dart points, cells.	
8000	Archaic	Poverty Point Late Archaic Early Archaic Dalton	Seasonal use of different sites, hunting, fishing and foraging economy, dart points, grooved axes and a variety of stone tools (which persist in time), poverty point objects, adzes.	
10,000+	Paleo-Indian		Fluted points, big game hunting.	

REGIONAL PREHISTORY

The studies described above and work in adjacent regions have resulted in the definition of the broad pattern of cultural history and prehistory in the region. However, knowledge of the region is still sketchy with few Archaic and Woodland period sites having been excavated. This status has seriously constrained our understanding of settlement systems. Therefore, while this region may be fairly well known with respect to the Mississippi period, much more work needs to be done before the basic contents and definitions of many archeological units in space and time are adequate (cf. Morse 1982a). Currently we have a few key diagnostic types associated with some cultural units, but the range of artifact assemblage variation across chronological and spatial boundaries is not yet defined. Nor are the ranges of site types known for any of the defined units. The adequate definition and resolution of these fundamental questions and problems are necessary before we can begin to reconstruct and use the data for understanding more abstract cultural processes, as is possible in better known archeological areas such as the American Southwest.

The Paleo-Indian period (10,000-8,500 B.C.) is known in the region from scattered projectile point finds over most of the area. These include nine Clovis and Clovis-like points from the Bootheel of Missouri (Chapman 1975:93). No intact sites have yet been identified from this period, and the basal deposits of the major bluff shelters thus far excavated in the nearby Ozark Mountains have contained Dalton period assemblages. Lanceolate points are known from bluff shelters and high terraces (Sabo et al. 1982:54), which may represent different kinds of activities or extractive sites, as they have been shown to have been in other parts of the country. For the present any Paleo-Indian site in the region is probably significant.

The Dalton period (8,500-7,500 B.C.) is fairly well known in the Lower Mississippi Valley, which has produced some of the better known Dalton components and sites in the central continent. These include the Sloan site (Morse 1973) and the Brand site (Goodyear 1974). These and other more limited or specialized excavations and analyses have resulted in the identification of a number of important Dalton tools (i.e., Dalton points with a number of resharpening stages, a distinctive adze, spokeshaves, several varieties of unifacial scrapers, stone abraders, bone awls and needles, mortars, grinding stones, and pestles). At least three different site types have been excavated: the bluff shelters, which were seasonal habitation sites, a butchering station (the Brand site), and a cemetery (the Sloan site). We do not have the other part(s) of the seasonal pattern which should be present in the region; nor have any other specialized activity sites been excavated. Dalton sites are known in a number of locations, especially on the edge of the relict braided surface, on Crowley's Ridge and the edge of the Ozark Escarpment. Given the present resource base, a number of important questions have been posed concerning the early widespread adaptation to this environment (Price and Krakker 1975; Morse 1982a, 1976). Adjacent areas of the Ozarks have had modern controlled excavations from Rogers, Albertson, Tom's Brook, and Breckenridge shelters (McMillan 1971; Kay 1980; Dickson 1982; Logan 1952; Bartlett 1963, 1964; Wood 1963; Thomas 1969).

The Early to Middle Archaic periods (7,500 - 3,000 B.C.) are best known from bluff shelter excavations in the Ozarks (Rogers, Jakie's, Calf Creek, Albertson, Breckenridge and Tom's Brook shelters). During this long period a large number of different projectile point types were produced (i.e., Rice Lobed, Big Sandy, Graham Cave, Kirk Corner Notched, White River Archaic, Hidden Valley Stemmed, Hardin Barbed, Searcy, Rice Lanceolate, Jakie Stemmed, and Johnson). Five Early Archaic points were recovered at 23SO496. No controlled excavations have been done at any Early or Middle Archaic site in southeast Missouri or northeast Arkansas (Chapman 1975:152). There are no radiocarbon dates for any of the Archaic period from southeast Missouri (Dekin et al. 1978:78-79; Chapman 1980:234-238). The Middle Archaic archeological components are rare to absent in the Central Mississippi Valley, leading the Morses to propose that the region was abandoned during this dry period (Morse and Morse 1983). Therefore, much of what we know of the archeological manifestations of this period is based upon work in other regions that has been extrapolated to the Mississippi Valley. At present, phases have not been defined.

The Late Archaic period (3,000 B.C. - ~ 500 B.C.) appears to be a continuing adaptation to the wetter conditions following the dry Hypsithermal. This corresponds to the sub-Boreal climatic episode (Sabo et al. 1982). The lithic technologies appear to run without interruption through these periods, with ceramics added at about the beginning of the present era. Major excavations of these components have taken place at Poverty Point and Jaketown in Louisiana and Mississippi (Ford, Phillips and Haag 1955; Webb 1968). A fairly large number of Late Archaic sites are known in eastern Arkansas and Missouri (Chapman 1975:177-179,224; Morse and Morse 1983:114-135). Major point types include Big Creek, Delhi, Pandale, Gary and Uvalde points. Other tools include triangular bifaces, manos, grinding basins, grooved axes, atlatl parts and a variety of tools carried over from the earlier periods such as scrapers, perforators, drills, knives, and spokeshaves. Excavations at the Phillips Spring site have documented the presence of tropical cultigens (squash and gourd) by ~ 2,200 B.C. (Kay et al. 1980). The assemblages recovered in the bluff shelters from this time period indicate there was a change in the use from general occupation to specialized hunting/butchering stations (Sabo et al. 1982:63). There are some indications of increasing sedentariness in this period; however, the range of site types have not been defined. Late Archaic artifacts are well known from the region, with artifacts usually present on any large multicomponent site. Our understanding of this period is limited to excavations from a few sites (Morse and Morse 1983; Lafferty 1981). At present we do not know the spatial limits of any phases, which have not been defined, nor do we have any control over variation in site types and assemblages.

The Early Woodland period (500 B.C.(?) - 150 B.C.) saw the lithic traditions from the previous period continue and pottery begun. As with the Archaic period, this is a little understood archeological period with no radiocarbon dates for the early portions of the sequence. The beginning of the period is not firmly established, and its termination is based on the appearance of Middle Woodland ceramics dated at the Burkett site (Williams 1974:21). The original definition of the Tchula period was made by Phillips, Ford, and Griffin (1951:431-436). In the intervening time a fair amount of work has been done on Woodland sites. Chapman concludes that we are not yet able to separate the Early Woodland assemblages from the components preceding and following. At present there is considerable question if there is an Early Woodland period in southeast Missouri (Chapman 1980:16-18). Recent work in northeast Arkansas, however, has identified ceramics which appear stylistically to be from this time period (Morse and Morse 1983; Lafferty et al. 1985 a). J. Price (personal communication) has identified a similar series of artifacts in the southeast Missouri Bootheel. Artifacts include biconical Poverty Point objects, cordmarked pottery with noded rims similar to Crab Orchard pottery in southern Illinois and the Alexander series pottery in the Lower Tennessee Valley, and Hickory Ridge points. MCRA has recently tested several sites (3MS21, 3MS119, 3MS199 and 3MS471) near the current survey area that contain Early Woodland components.

Middle and Late Woodland periods (150 B.C. - A.D. 850) were a time of change. Participation in the "Hopewell Interaction Sphere" (dentate and zone-stamped pottery, exotic shell; Ford 1963) and an increase in horticulture (corn, hoe chips, and farmsteads) become evident. Mound construction, notably the Helena mounds at the south end of Crowley's Ridge (Ford 1963) indicates greater social complexity. Typical artifacts include Snyder, Steuben, Dickson, and Waubesa projectile points and an increasing number of pottery types (cf. Rolingson 1984; Phillips 1970; Morse and Morse 1983). In the Late Woodland period there is an apparent population explosion as evidenced by a great number of sites with plain grog-tempered pottery in the east and Barnes sand-tempered pottery in the west of the Central Valley (Morse and Morse 1983: 180; Chapman 1980). In this period there is some evidence of architecture (cf. Morse and Morse 1983; Spears 1978) as well as mound center construction (Rolingson 1984). A number of large open sites have not been excavated, so the spectacular mound centers appear to shape what we know about this important period. A great deal is not understood about the cultural sequence and changes that occurred then. The Late Woodland period in this area has been suggested as the underlying precursor to the Mississippi period, which came crashing into the area with the introduction (invention?: cf. Price and Price 1981) of shell-tempered pottery and the bow and arrow around A.D. 850.

The Mississippi period (A.D. 850-1673) is known from the earliest investigations in the region (Thomas 1894; Holmes 1903; Moore 1916). It has been the most intensively investigated portion of the prehistoric record in northeast Arkansas and southeast Missouri (Chapman 1980; Morse and Morse 1983; Morse 1982 b; Morse 1981; House 1982). Enough work has been done to define the spatial limits of phases (cf. Chapman 1980; Morse and Morse 1983; Morse 1981). During this period the native societies reached their height of development with fortified towns, organized warfare, more highly developed social organization, corn, bean, and squash agriculture, and extensive trade networks. The bow and arrow was common and there was a highly developed ceramic technology (cf. Lafferty 1977; Morse and Morse 1980; Smith 1978). This effervescence was abruptly terminated by the De Soto entrada in the mid-16th century (Hudson 1984, 1985; Morse and Morse 1983) which probably passed through the project area.

PROTOHISTORIC PERIOD

The De Soto entrada resulted in the first recorded descriptions of Mississippi County, Arkansas, and the Mississippian Climax (Varner and Varner 1951; Hernandez de Biedma 1851; Elvas 1851;). The interpretation of places herein follows those of Morse (1981) and Hudson (1985). In the summer of 1541 De Soto was allied with the Casquians in a military expedition against the province of Pacaha. According to Morse:

The large swamp up the Tyronza [between Tyronza Junction and Victoria in the southwest corner of the county] is a suitable candidate for the boundary between Casqui and Pacaha. Pecan Point, a Nodena phase village near the Mississippi River [southeast of Wilson], could probably be the location of the capital of Pacaha. It was an impressive site producing numerous fine pottery specimens, and is located an appropriate distance from Parkin. An expedition left Pacaha for an area "40 leagues distance" to get salt and yellow metal (Varner and Varner 1951:449). The only area where both salt and copper occur together in large amounts is in southeast Missouri, within easy reach of the Nodena phase [which occupied most of Mississippi County east of Big Lake]. Mountains also occur here as observed by the Spanish (Morse 1981:68).

There is some evidence that this exploratory expedition traveled north from Pacaha through the Missouri Lootheel. The Campbell site, a large Nodena site located 1 km east of the project area is reported to have produced 16th century European artifacts. An expedition of 25 Spaniards traveled north and back in about a month and reported that the lands of the bootheel were scraggly blasted old fields with few people.

Historic Period (1673-present). Following the De Soto expedition the area was not visited until the French opened the Mississippi Valley in the last quarter of the 17th century. The Indian societies were a mere skeleton of their former glory and the population a fraction of that described in the De Soto chronicles. Marquette, in his rediscovery of the Mississippi for the French, did not encounter any Indians between the Ohio and the Arkansas Rivers. He described this section of his journey south of the Ohio River as follows:

Here we began to see Canes, or large reeds, which grow on the banks of the river; their color is a very pleasing green; all the nodes are marked by a Crown of Long, narrow, pointed leaves. They are very high, and grow so thickly that The wild cattle have some difficulty in forcing their way through them.

Hitherto, we had not suffered any inconvenience from the mosquitoes; but we were entering their home, as it were. . .

We thus push forward, and no longer see so many prairies, because both shores of The river are bordered with lofty trees. The cottonwood, elm, and basswood trees there are admirable for Their height and thickness. The great numbers of wild cattle, which we heard bellowing, lead us to believe that The Prairies are near. We also saw Quail on the water's edge. We killed a little parroquet, one half of whose head was red, The other half and The Neck was yellow, and The whole body green (Marquette 1954:360-361; strange capitalization in the French original).

During the French occupation most of the settlements were restricted to the major river courses with trappers and hunters living isolated lives in the headwaters of the many smaller creeks and rivers. The St. Francis River was one of the earliest explored tributaries of the Mississippi River in the Lower Mississippi Valley and appears on some of the earliest French maps.

EARLY AMERICAN SETTLEMENT

In 1803, the French sold the Louisiana Territory, which included today's Missouri, to the United States. The territory was administered from the territorial capital in St. Louis.

The Euro-American occupation proceeded overland down Crowley's Ridge, spreading out from the rivers. In 1835, ports were established at Piggott, on the high ground of Crowley's Ridge in the St. Francis Gap. Piggott was located on the Helena-Wittsburg road which ran down Crowley's Ridge (Dekin et al. 1978:358) and crossed the Castor River 3.3 miles downstream from 23SO496. This is across the narrowest part of the flood plain and the only place where there are well drained soils all the way across the flood plain. All settlements in the 1830s, between Piggott and Helena in the St. Francis Basin, were either along rivers or on Crowley's Ridge. Bloomfield, on Crowley's Ridge, was founded in 1824, while Malden, on the plain, was founded in 1877. Towns continued to be established in these environments into the early 1900s. Settlements away from the rivers and along overland roads began in the 1850s. They greatly accelerated with the construction of the railroads, levees and drainage ditches in the late 19th century.

The passage of the stern-wheel steamboat, "Orleans", from Pittsburgh to New Orleans in 1812 presaged great changes for the Louisiana Territory. This boat and the many others to follow used wood to power their steam engines and thus created a demand for cordwood. The early settlers, who tended to live in cabins in clearings along the river, met this need by chopping and selling wood to the boats (Edrington 1962: 49). Perhaps more importantly, the steamboat made two-way transportation on the great river roads in the nation's heart much faster and more reliable - when the rivers were up.

METHODS USED, AREAS INVESTIGATED, AND RESULTS

Introduction

Methods used during the cultural resources survey along Sals Creek were essentially dictated by the scope-of-work. Certain modifications were made, however, when details of the ditch construction became known.

Methods Used and Areas Investigated

Prior to initiating fieldwork, the Missouri Archeological Survey was contacted to determine whether previously recorded sites are in the project area. Interviews with Mr. Donny Howser and Mr. Jim Hess followed. Both individuals have lived in the area all their life and farm ground in or near the project area. They witnessed the initial ditching of Sals Creek and provided critical information on the cross section of the ditch and what was actually done. In addition, Mr. Howser was willing to point out any unrecorded sites within the project area.

Areas with any appreciable degree of visibility were surfaced inspected and shovel tests were excavated where visibility was poor. The shovel tests were spaced ca. 30 m apart and excavated to 50 cmbs (centimeters below the surface). All removed soil was screened through 1/4" hardware cloth.

On the north side of Sals Creek, from the west boundary to the "rock cut", 38 shovel tests were excavated (Figure 5). These were generally within 50' of the base of the spoil pile. Based on the interviews, any original land surface was within 50' of the spoil pile base. The integrity of this area, however, remains in question. Heavily mottled soil was documented in shovel tests near the base of the spoil pile, as well as those excavated near the creek bank. Silt with Munsell values of 10YR6/4 (light yellowish brown), 10YR7/2 (light gray), and 10YR5/6 (yellowish brown) was recorded at the west end of the project area. Soil with similar Munsell values was documented in shovel tests near the "rock cut"; however, the presence of clay with a Munsell value of 7.5YR5/6 (strong brown) was documented. Very small concretions were evident throughout most of the shovel tests.

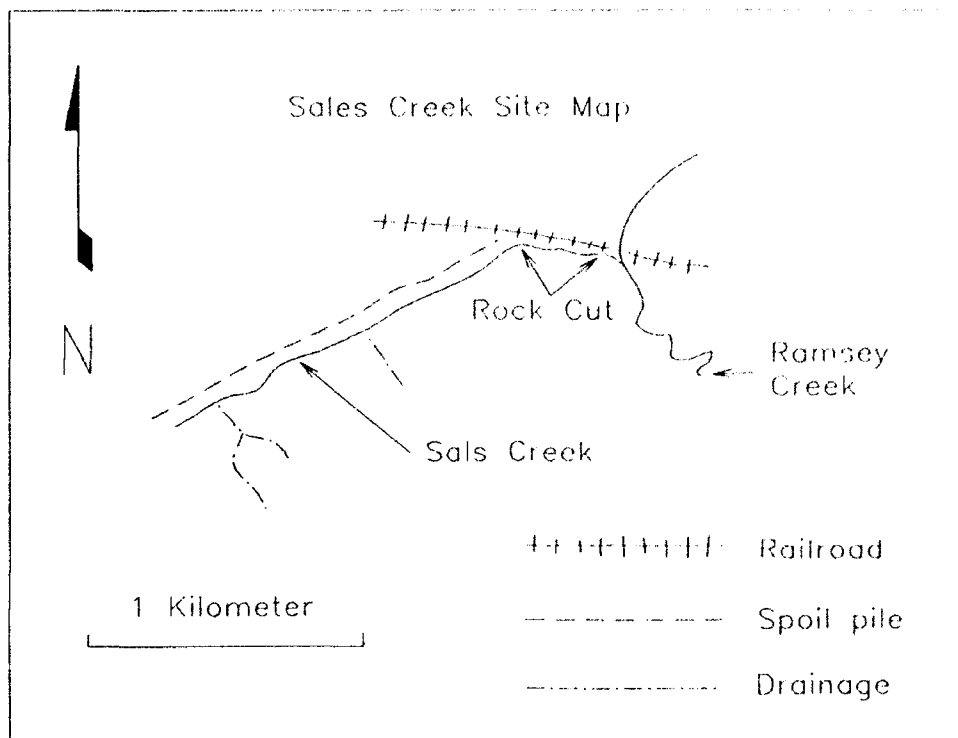
The area known as the "rock cut" was not investigated. It was removed from the investigation by Mr. Jimmy McNeil (MCOE archeologist) because this portion of the project area was completely covered by a spoil pile.

On the south side of Sals Creek, from its confluence with Ramsey Creek, west to the west end of the "rock cut", six shovel tests were excavated. A site covered this .24 miles, so shovel tests were only excavated in areas that had 0% surface visibility or where surface artifacts were not observed. All but one of the shovel tests was on the terrace. No variability in the soils was apparent in the shovel tests; silt with a Munsell value of 10YR5/4 (yellowish brown) was recorded. Inspected surface areas included the terrace slope, along the fence line, a single cow path, and the eroded bank of a minor drainage near the west end of the project area.

Six shovel tests were excavated at the unnamed drainage, midpoint of the project area. In addition, the eroded creek bank was inspected.

At the unnamed west drainage, shovel tests were excavated. The bank of Sals Creek, around the feeding areas, along the eroded banks of the unnamed drainage, and along the fence line were surface inspected.

The steep slope between the drainages was minimally inspected due to the level of disturbance documented during the interview. Less than ten shovel tests were excavated in areas that were flat when compared to the surrounding ground surface. In each instance, areas were very small and rocks/bedrock prevented shovel tests from extending beyond 25 cmbs.



Results

The Missouri Archeological Survey did not show any previously recorded sites within the project area. Three sites were in the immediate vicinity, of which, two were reported mound sites, 23ST113 and 23ST114. These two sites were on the bluff overlooking 23ST221. The third site, 23ST115, is immediately east of 23ST221.

Two prehistoric sites were recorded during MCRA's investigations. Each site had artifacts in shovel tests.

23ST221 is at the east end of the project area and is in pasture. The site is on Adler silt loam and ranges from 350-370' above mean sea level (amsl). It is bounded on the east by Ramsey Creek. The west and north boundaries are Sales Creek. The south boundary was not firmly determined, though it is anticipated that the site encompasses the floodplain and first terrace. Based on shovel test results shovel tests and surface artifact distributions, the site size was established at 370 m NW/SE by 30 m

NE/SW. The NE/SW size is considered a minimum measurement, since the project area did not encompass the entire floodplain and first terrace. Surface visibility was variable on the site. Surface visibility was 0% in the floodplain and on most of the terrace. Surface visibility was 20-40% along the fence line, on a cow path, and on the terrace slope. Surface visibility was 80-100% on, and along, the bank of the entrenched small drainage at the west end of the site.

Investigations at 23ST221 included excavation of six shovel tests to 50 cmbs and close inspection of all areas with surface visibility. Surface cultural material was restricted to the area along the fence line, on the terrace, and on the bank of the entrenched drainage at the west end of the site. Artifacts observed on the surface included flakes and a single biface fragment. The greatest number of surface artifacts were observed at the west end of the site, where the small entrenched drainage is located. Cultural material was recovered from five of the six shovel tests excavated (Table 1). No temporally sensitive artifacts were recovered. However, the recovery of a polished Mill Creek flake from Shovel Test 2 may indicate Mississippi period occupation. Raw materials included Burlington chert, Mill Creek chert, and Mounds Gravel.

Table 1. Artifacts from 23ST221.

Number/Grams	Flake		Biface		Polished Flake		Sandstone		Decortication Flake		Quartzite	
	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt
Surface	2	0.7	1	6.3								
Shovel Test 1	1	0.4										
Shovel Test 2	1	0.2			1	0.1						
Shovel Test 3							1	31.3				
Shovel Test 4	1	0.5										
Shovel Test 5	2	2.5	1	0.6					1	1.3	1	37.6
Total	7	4.3	2	6.9	1	0.1	1	31.3	1	1.3	1	37.6

23ST222 is at the western end of the project, in an area used as pasture, feeding area for cattle, and equipment storage. The site is on Adler silt loam and ranges between 340-350' amsl. The only evidence of this site was flakes in shovel tests. As a result, the limits given should be considered tentative until extensive testing is completed. The site is at the confluence of a unnamed drainage and Sals Creek. Steep slopes give way to flat ground on east and west of the unnamed drainage. Based on the positive shovel tests, the site measured 20 m N/S by 60 m E/W. Given the aerial extent of the flat ground however, it is anticipated that the site size is much larger. Surface visibility was variable across the site. Along the fence line (north), around the cattle feeding areas, and along the drainage entering Sals Creek, surface visibility was 80-100% and surface visibility was 30-40% in the field road through the area. The surface was not visible in other areas.

Land forming to aid drainage and the building up of the ground surface for structures occurred on the east side of the drainage. The original land surface was from 35-40 cmbs, as documented in shovel tests excavated between the two large structures.

Areas with surface visibility were inspected and shovel tests were excavated to 50 cmbs at 23ST222. No artifacts were observed on the surface. Of the 20 shovel tests excavated in the flat area around the drainage entering Sals Creek, two were positive. These were at the east end of the flat area, beginning approximately 35 m from the base of the steep slope. Cultural material from Shovel Test 2 consisted of three flakes (1.3 g). A flake (.6 g) and decortication flake (1.0 g) were recovered in Shovel Test 3. Raw materials consisted of Burlington chert and Mounds Gravel.

Recommendations

MCRA recommends that the ditch work be done from the north bank to avoid impact to the archeological sites. If the sites cannot be avoided then they should be tested for NRHP significance.

If 23ST221 is to be impacted by the planned clean out of Sals Creek ditch, it is recommended that extensive testing be conducted to determine if significant archeological deposits are present. Investigations conducted at 23ST222 were not designed to gather the types of data needed to determine its potential significance. Based on MCRA's investigations, we believe buried cultural deposits are possible. The shovel tests had soils at 50 cmbs that could contain cultural deposits. The excavation of shovel test recorded soils at 50 cmbs that possess the possibility of containing cultural deposits. Testing should identify the site boundaries, determine the presence or absence of intact cultural deposits, and determine if truncated features are present. Sufficient information should be gathered to develop a mitigation plan in the event 23ST221 is determined to be significant and eligible for nomination to the NRHP.

If 23ST222 is to be impacted by the planned clean out of Sals Creek ditch, it is recommended that extensive testing be conducted to determine if significant archeological deposits are present. Investigations conducted at 23ST222 were not designed to gather the types of data needed to determine its potential significance. Based on MCRA's investigation, we believe buried cultural deposits are possible. The shovel tests had soils at 50 cmbs that could contain cultural deposits. The excavation of shovel tests recorded soils at 50 cmbs that possess the possibility of containing cultural deposits. Testing should identify the site boundaries, determine the presence or absence of intact cultural deposits, and determine if truncated features are present. Sufficient information should be gathered to develop a mitigation plan in the event 23ST222 is determined to be significant and eligible for nomination to the NRHP.

REFERENCES CITED

- Adams, Robert M., and Winslow Walker
1942 Archeological Surface Survey of New Madrid County, Missouri. Archeologist 8 (2).
- Arkansas Department of Planning
1978 Arkansas Natural Plan. Arkansas Department of Planning, Little Rock.
- Bartlett, Charles S., Jr.
1963 Tom's Brook Site - 3JO1: A Preliminary Report. In Arkansas Archeology 1962, edited by C. R. McGimsey III, pp. 15-65. Arkansas Archeological Society, Fayetteville.
- Butler, Brian M.
1978 Settlement in the Black Bottom, Pope and Massac Counties, Illinois. Ph.D. Dissertation, Department of Anthropology, Southern Illinois University, Carbondale.
- Butler, Brian M., and Ernest E. May
1984 Chert Exploitation--Studies from the Midcontinent. Center for Archeological Investigations, Occasional Papers No.2. Southern Illinois University, Carbondale.
- Chapman, Carl H.
1952 Cultural Sequence in the Lower Missouri Valley. In Archeology of the Eastern United States, edited by J. B. Griffin, pp.139-151. Chicago.

1975 Archeology of Missouri, I. University of Missouri Press, Columbia.

1980 Archeology of Missouri, II. University of Missouri Press, Columbia.
- Chapman, Carl H., and Lee O. Anderson
1955 The Campbell Site, a late Mississippi townsite and cemetery in southeast Missouri. The Missouri Archeologist 17(2-3).
- Chapman, Carl H., John Cottier, David Denman, David Evans, Dennis Harvey, Michael Ragan, Bradford Rope, Michael Southland, and Gregory Waselkov
1977 Investigation and Comparison of Two Fortified Mississippi Tradition Archeological Sites in Southeastern Missouri: A Preliminary Compilation. Missouri Archeologist No. 38.
- Chapman, Jefferson, Paul A. Delcourt, Patricia A. Cridlebaugh, Andrea B. Shea, and Hazel R. Delcourt
1982 Man-Land Interaction: 10,00 Years of American Indian Impact on Native Ecosystems in the Lower Little Tennessee River Valley, Eastern Tennessee. Southeastern Archeology, 1 (2):115-121.

Cottier, John W., and M.D. Southard

- 1977 An Introduction to the Archeology of Towosahgy State Archeological Site. The Missouri Archeologist 38:230-271.

Dekin, Albert, and Cecil Brooks, Douglas Edsall, James Mueller, Robert Pasnat, Peter Skirbunt, Sally Tompkins, with Charles Lee Decker, James O'Donnell, Vanessa Patrick, Genevieve Poirier and Phyllis Morse, Martin Pociask and Bernard Poirier.

- 1978 Predicting Cultural Resources in the St. Francis Basin, a Research Design. Iroquois Research Institute. Report submitted to the U. S. Army Corps of Engineers.

Delcourt, Paul A., H. R. Delcourt, R. C. Brister and L. E. Lackey

- 1980 Quaternary Vegetation History of the Mississippi Embayment. Quaternary Research 13:111-132.

Dickson, Don R.

- 1982 The Albertson site No. 1 (3BE174). Ms. on file, Arkansas Archeological Survey, Fayetteville.

Edrington, Mabel

- 1962 History of Mississippi County, Arkansas. Ocala Star Banner, Ocala, Florida.

Elvas, Gentleman of

- 1851 An Account of the Expedition of Captain De Soto's Expedition in the Province of Florida. In The Discovery and Conquest of Terra Florida, by Don Fernando De Soto, and Six Hundred Spaniards His Followers edited by Richard Hakluyt. The Hakluyt Society, London.

Fehon, Jacqueline R.

- 1975 Environmental Setting. In The Cache River Archeological Project. Assembled by Michael B. Schiffer and John House. Arkansas Archeological Survey Research Series No.8.

Ford, James A.

- 1963 Hopewell Culture Burial Mounds Near Helena, Arkansas. Anthropological Papers of the American Museum of Natural History, Vol. 50, Part 1. New York.

Ford, James A., Phillip Phillips and William S. Haag

- 1955 The Jaketown Site in West-Central Mississippi. Anthropological Papers of the American Museum of Natural History, Vol. 45, Part 1.

Ford, James A., and Gordon R. Willey

- 1941 An Interpretation of the Prehistory of the Eastern United States. American Anthropologist 43 (3):325-363.

Gilmore, Michael

- 1979 An Archeological Survey of Mingo National Wildlife Refuge:1978. Submitted to the Fish and Wildlife Service, Dept. of Interior, Washington. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-128.

Greer, John W. (Assembler)

- 1978 Cultural Resources Study of the P62 Products Line across southeast Missouri. Archeological Services Survey Report No. 2, Columbia, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-73.

Goodyear, Albert C.

- 1974 The Brand Site: A Techno-functional Study of a Dalton Site in Northeast Arkansas. Arkansas Archeological Survey Research Series 7. Fayetteville.

Griffin, James B.

- 1952 Prehistoric Cultures of the Central Mississippi Valley. In Archeology of Eastern United States, edited by J. B. Griffin, pp. 226-238. Chicago.

Guccione, Margaret J., Robert H. Lafferty and Linda Scott Cummings

- 1988 Environmental Constraints in Human Settlement in an Evolving Holocene Alluvial System, the Lower Mississippi Valley. Geoarchaeology: An International Journal, 3 (1):65-84. John Wiley and Sons, Inc.

Harlow, William M., and Ellwood S. Harrar

- 1968 Textbook of Dendrology. McGraw Hill Book Company, New York.

Hawker, Jon L.

- 1987 Missouri Natural Communities. A Natural History of the Crossroads State. Merimac Community College, St. Louis.

Hemmings, E. Thomas

- 1982 Human Adaptation in the Grand Marais Lowland. Arkansas Archeological Survey, Research Series No. 17.

Hernandez de Biedma, Luis

- 1851 A Relation of What Took Place During the Expedition of Captain Soto: With Particulars Concerning the Nature of the Country Through Which he Passed. In The Discovery and Conquest of Terra Florida, by Don Fernando De Soto, and Six Hundred Spaniards His Followers, edited by Richard Hakluyt. The Hakluyt Society, London.

Holmes, William H.

- 1903 Aboriginal Pottery of the Eastern United States. Twentieth Annual Report, Bureau of American Ethnology. Washington, D. C.

Hopgood, James F.

- 1969 An Archeological Reconnaissance of Portage Open Bay in southeast Missouri. Missouri Archeological Society Memoir No. 7. Columbia.

House, John H.

- 1982 Powell Canal: Baytown Period Occupation On Bayou Macon In Southeast Arkansas. Arkansas Archeological Survey Research Series 19. Fayetteville.

Hudson, Charles

- 1984 The Route of De Soto Through Arkansas. Paper presented at the Department of Anthropology Colloquium, University of Arkansas, Fayetteville.
- 1985 De Soto in Arkansas: A Brief Synopsis. In Field Notes. Arkansas Archeological Society Number 205, July/August. Fayetteville.

Iroquois Research Institute

- 1978 A Survey Level Report of the Castor River Ditch Enlargement Project, Item 1, Stoddard County, Missouri. Submitted to the U.S. Army Corps of Engineers, Memphis District by I.R.I. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-213.

Kay, Marvin (editor)

- 1980 Holocene Adaptations within the lower Pomme de Terre River Valley, Missouri. ISM Society, Springfield, Illinois. Submitted to U. S. Army Corps of Engineers, Kansas City. Contract No. DACW41-76-C-0011.

Klinger, Timothy C.

- 1982 Mangrum Arkansas Archeological Survey Research Series, No. 20. Fayetteville.

Klinger, Timothy C., and Mark A. Mathis (assemblers)

- 1978 St. Francis II. Arkansas Archeological Survey Research Report 14, Fayetteville.

Klinger, Timothy C., Carol S. Spears, Ross A. Dinwiddie, Michael C. Sierzchula, Cynthia R. Price and James E. Price

- 1981 Cultural Resources Survey and Testing in the Bootheel Region of Missouri. Historic Preservation Associates. Submitted to the U. S. Army Corps of Engineers, Memphis District, Contract No. DACW66-81-C-0032.

Kraker, James J.

- 1977 Archeological Survey in Mingo National Wildlife Refuge: an Investigation of Changing Adaptations in the Ozark Border. Submitted to the U. S. Fish and Wildlife Service, Mingo National Wildlife Refuge, Puxico, Missouri.

Kuchler, A.W.

- 1964 Potential Natural Vegetation of the United States. American Geographical Society, New York.

Lafferty, Robert H., III

- 1977 The Evolution of the Mississippian Settlement Pattern and Exploitative Technology in the Black Bottom of Southern Illinois. Ph.D. dissertation, Department of Anthropology, Southern Illinois University, Carbondale.
- 1981 The Phipps Bend Archeological Project Office of Archeological Research, Research Series No. 4 University of Alabama and T.V.A. Publications in Anthropology, No. 26, Chattanooga, Tennessee.

- 1984 Lithic Resources Exploitation and Use in the Felsenthal Uplands. In Final Report of Final Phase II Survey and Phase III Site Evaluation, Sparta Mine Area, edited by Robert H. Lafferty III and John H. House. Submitted to Shell Oil Company, Houston Texas, by the Arkansas Archeological Survey, Project No. 517.

Lafferty, Robert H., III, L. G. Santeford, Phyllis. A. S.
Morse, and L. M. Chapman

- 1984 A Cultural Resources Survey and Evaluation in the Tyronza River Watershed Phase I Area, Mississippi County, Arkansas. MCRA No. 84-2,. Submitted to USDA, Soil Conservation Service, Little Rock, Contract No. 54-7103-3-290.

Lafferty, Robert H. III, Carol S> Spears, and Michael C. Sierzchula

- 1985 National Register of Historic Places Significance Testing at Six Sites (23SO: 459, 465, 471, 496, 497, and 500) in the Castor River Enlargement Project, Stoddard County, Missouri. Report submitted to Memphis District, Corps of Engineers.

LeeDecker, Charles H.

- 1979 A Survey Level Report of the Ditch 24 enlargement project. Submitted to U. S. Army Corps of Engineers, Memphis District by Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-129.

Lewis, R. Barry

- 1974 Mississippian Exploitative Strategies: A Southeast Missouri Example. Missouri Archeological Society, Research Series No. 11.

Logan W. D.

- 1952 Graham Cave: An Archaic Site in Montgomery County Missouri Memoir, Missouri Archeological Society, No. 2.

Marshall, Richard A.

- 1965 An Archeological Investigation of Interstate Route 55 through New Madrid and Pemiscot Counties Missouri, 1964. University of Missouri, Highway Archeological Report, No. 1, Columbia.

McMillan, R. Bruce

- 1971 Biophysical Change and Cultural Adaptation at Rogers Shelter, Missouri. Ph.D. dissertation, University of Colorado, Denver.

McNeil, Jimmy D.

- 1982 A Cultural Resources Survey of the Ditch 75, Blytheville Air Force Base, Mississippi County, Arkansas. U.S. Army Corps of Engineers, Memphis District.

- 1984 A Cultural Resources Survey in the Mingo Ditch Scour Repair Project. Prepared by the U. S. Army Corps of Engineers, Memphis District. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-360.

Medford, Larry

- 1972 Site Destruction Due to Agricultural Practices in Northeast Arkansas. Arkansas Archeological Survey Research Series No. 3. Fayetteville.

- Moore, Clarence B.
1916 Additional Investigations on the Mississippi River. Journal of the Academy of Natural Sciences of Philadelphia 16:492-508.
- Monastersky
1989 Hills Point to Catastrophic Ice Age Floods. Science News.
- Morse, Dan F.
1973 Nodena. Arkansas Archeological Survey Research Series No. 4. Fayetteville.
- 1982a Northeast Arkansas. In A State Plan for the Conservation of Archeological Resources in Arkansas, edited by H. A. Davis. Arkansas Archeological Survey Research Series No. 21. Fayetteville.
- 1982b Regional Overview of Northeast Arkansas. In Arkansas Archeology in Review edited by Neal L. Trubowitz and Marvin D. Jeter, pp.20-36. Arkansas Archeological Survey Research Series No. 15. Fayetteville.
- Morse, Dan F. and Phyllis A. Morse
1983 Archaeology of the Central Mississippi Valley. Academic Press, New York.
- Morse, Dan F. and Phyllis A. Morse (editors)
1980 Zebree Archeological Project. Arkansas Archeological Survey, Fayetteville. Submitted to Memphis District, U. S. Corps of Engineers.
- Morse, Phyllis A.
1979 An archeological survey of portions of the Big Lake National Wildlife Refuge. Arkansas Archeological Survey. Submitted to Heritage Conservation and Recreation Service, IAS, Atlanta.
- Moselage, John H.
1962 The Lawhorn Site. Missouri Archaeologist 24.
- Muller, Jon D.
1978 The Kincaid System: Mississippian Settlement in the Environs of a Large Site. In Mississippian Settlement Patterns, edited by Bruce D. Smith, pp. 269-292. Academic Press, New York.
- Phillips, Philip
1970 Archaeological Survey in the Lower Yazoo Basin Mississippi 1949-1955. Papers of the Peabody Museum, Harvard University 60.
- Phillips, Philip, James Ford and James B. Griffin
1951 Archaeological Survey in the Lower Mississippi Alluvial Valley. 1940-1947. Papers of the Peabody Museum, Harvard University 25.
- Price, Cynthia R.
1976 A Cultural Resources Assessment of Six USDA Service Exchange Tracts: The Foerster and White Exchanges, Mark Twain National Forest. Submitted to USDA Forest Service, Rolla, Missouri.

- 1979 A Cultural Resources Survey of Areas to be Disturbed by Proposed Modifications to the existing Wastewater Treatment Facility, Moorehouse, New Madrid County, Missouri: 1979. Center for Archeological Research, Report No. 199. Springfield.

Price, James E.

- 1973 Settlement Planning and Artifact Distribution on the Snodgrass Site and their Socio-political Implications in the Powers Phase of Southeast Missouri. Ph.D. Dissertation, Department of Anthropology, University of Michigan, Ann Arbor.
- 1976a An Archeological Survey of Houck Park, Puxico, Stoddard County, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-17.
- 1976b An Archeological Survey of Boone Park, Dexter, Stoddard County, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-21.
- 1978 An Archeological Survey of the Proposed Sewer System, Puxico, Stoddard County, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-104.

Price, James E. and Cynthia R. Price

- 1980 A predictive model of archaeological site frequency for informed management of the resources within the proposed New Madrid, Pemiscot, and Dunklin Counties, Missouri 1979 Center for Archaeological Research, Southwest Missouri State University, Springfield.
- 1981 Changing Settlement Systems in the Fourche Creek Watershed in the Ozark Border Region of Southwest Missouri and Northeast Arkansas. Southwest Missouri State University, Center for Archeological Research, Report No. 251.
- 1984 Phase II Testing of the Shell Lake Site, 23WE-627, Near Wappapello Dam, Wayne County, Missouri, 1984. St Louis District, Cultural Resources Management Report No. 11. U.S. Army Corps of Engineers, St. Louis District.

Price, James E., and James J. Krakker

- 1975 Dalton Occupation of the Ozark Border. Museum Brief No. 20. Museum of Anthropology, University of Missouri, Columbia.

Price, James E., Lynn D. Morrow and Cynthia R. Price

- 1978 A Preliminary Literature Review of the Prehistoric and Historic Cultural Resources for the M & A Power Corporation Power Line Transect in New Madrid, Dunklin and Pemiscot Counties, Missouri, and Mississippi County, Arkansas: 1979. Center for Archeological Research, Southwest Missouri State University, Springfield.

Price, James E., and James B. Griffin

- 1979 The Snodgrass Site of the Powers Phase of Southeast Missouri. Anthropological Papers, Museum of Anthropology, University of Michigan 66.

Rolingson, Martha A. (editor)

- 1984 Emerging Patterns of Plum Bayou Culture. Arkansas Archeological Survey, Research Series No. 18. Fayetteville.

Sabo, George, III, David B Waddell, and J. H. House

- 1982 A Cultural Resources Overview of the Ozark-St. Francis National Forests, Arkansas. Arkansas Archeological Survey, Fayetteville. Submitted to and published by USDA-Forest Service, Ozark-St. Francis Forests, Russelville, Contract No.53-43ZP-1-00984.

Santeford, Lawrence G.

- 1982 Archeological Testing within the Keo-Independence-Dell 500 Kilovolt Power Line Corridor. Arkansas Archeological Survey project 508. Submitted to Arkansas Power and Light Company, Little Rock.

Saucier, Roger T.

- 1974 Quaternary Geology of the Lower Mississippi River Valley. Arkansas Archeological Survey Research Series No. 6, Fayetteville.

Shaw, David D.

- 1981 Lithic Procurement Models for Western Lowlands In The AP&L Keo to Dell 500 Kilovolt Transmission Line Archeological Surveys by Robert H. Lafferty III, D.D. Shaw, T.J. Padgett, N.L. Trubowitz, D.D. Jurney, S. Imhoff and J. T. Toney. Report on file Arkansas Archeological Survey, Fayetteville. Project No. 470.

Shelford, Victor E.

- 1963 The Ecology of North America. University of Illinois Press, Urbana.

Sjoberg, Alf

- 1976 Cultural Resources Survey of Areas for Proposed Water System Improvements for the City of Tallapoosa, Missouri. American Archeology Division, University of Missouri, Columbia.

Smith, Bruce D.

- 1978 Prehistoric Patterns of Human Behavior. Academic Press, New York.

Spears, Carol S.

- 1978 The Derossitt Site (3SF49): Applications of Behavioral Archeology to a Museum Collection Master's thesis, Department of Anthropology, University of Arkansas.

Thomas, Cyrus

- 1894 Report on the Mound Explorations of the Bureau of Ethnology. Bureau of American Ethnology 12th Annual Report.

Thomas, Ronald A.

- 1969 Breckenridge: A Stratified Shelter in Northwest Arkansas. Masters thesis, Department of Anthropology, University of Arkansas, Fayetteville.

Varner, John and Jeanette Varner (translators)

1951 The Florida of the Inca by Garcilaso de la Vega. University of Texas Press, Austin.

Webb, Clarence H.

1968 The Extent and Content of the Poverty Point Culture. American Antiquity 33:297-321.

Williams, J. Raymond

1968 Southeast Missouri Land Leveling Salvage Archeology, 1967. The Department of Anthropology, University of Missouri, Columbia. Submitted to National Park Service, Midwest Region, Lincoln, Nebraska.

1974 The Baytown Phases in the Cairo lowland of Southeast Missouri. The Missouri Archeologist 36.

Williams, Stephen

1954 An Archeological Study of the Mississippian Culture in Southeast Missouri. Unpublished Ph.D. Dissertation, Department of Anthropology, Yale University.

Wood, W. Raymond

1963 Breckenridge Shelter -- 3CR2: An Archeological Chronicle in the Beaver Reservoir area. In Arkansas Archeology 1962, edited by C. R. McGimsey III, pp. 67-96. Arkansas Archeological Society, Fayetteville.